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Self-assembling peptide-mimetic hydrogels as long-acting delivery platforms for HIV prevention

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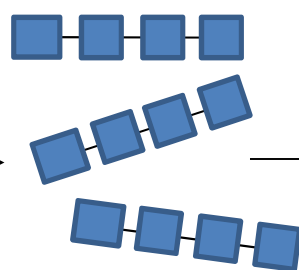
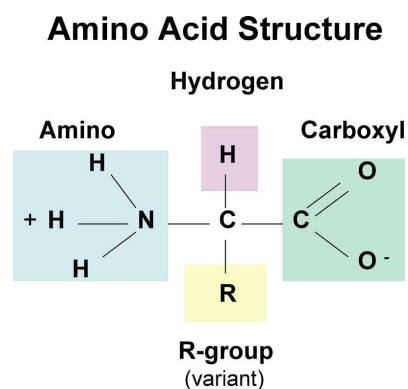
Self-assembling peptide-mimetic hydrogels as long-acting delivery platforms for HIV prevention.

Sophie Coulter
School of Pharmacy, QUB

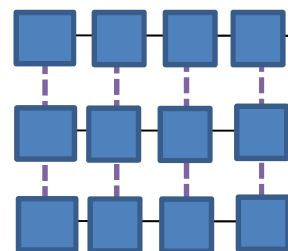
SfAM ECS Research Symposium 2019



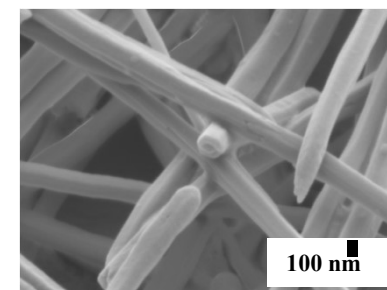
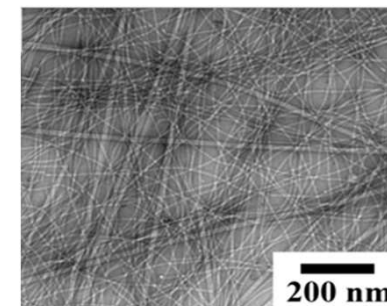
Our core technology



Short sequences
Non-assembled



Self-assembly

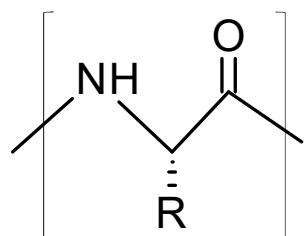


Why peptides/peptide-mimetics?

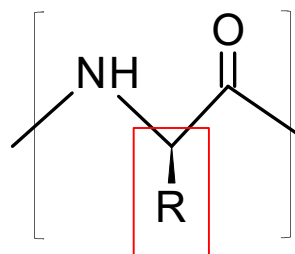
- Biocompatible
- Biodegradable
- Antimicrobial action
- Versatility
- Reduced synthesis times



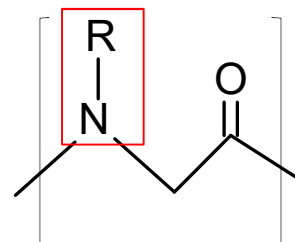
Peptide-mimetic hydrogels



L form peptide

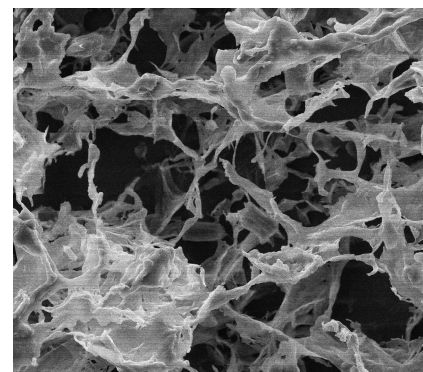
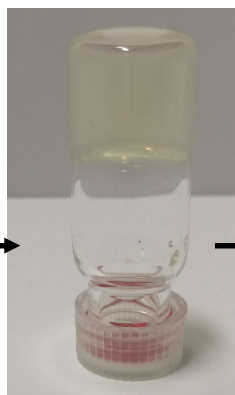
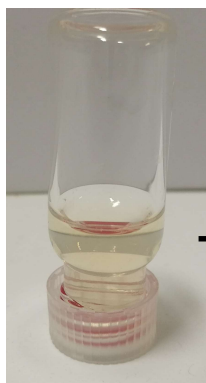


D form peptide

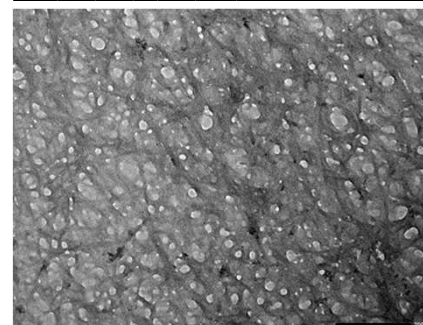


Peptoid

Synthesised sequence → conjugate drug → hydrogel formation → sustained release



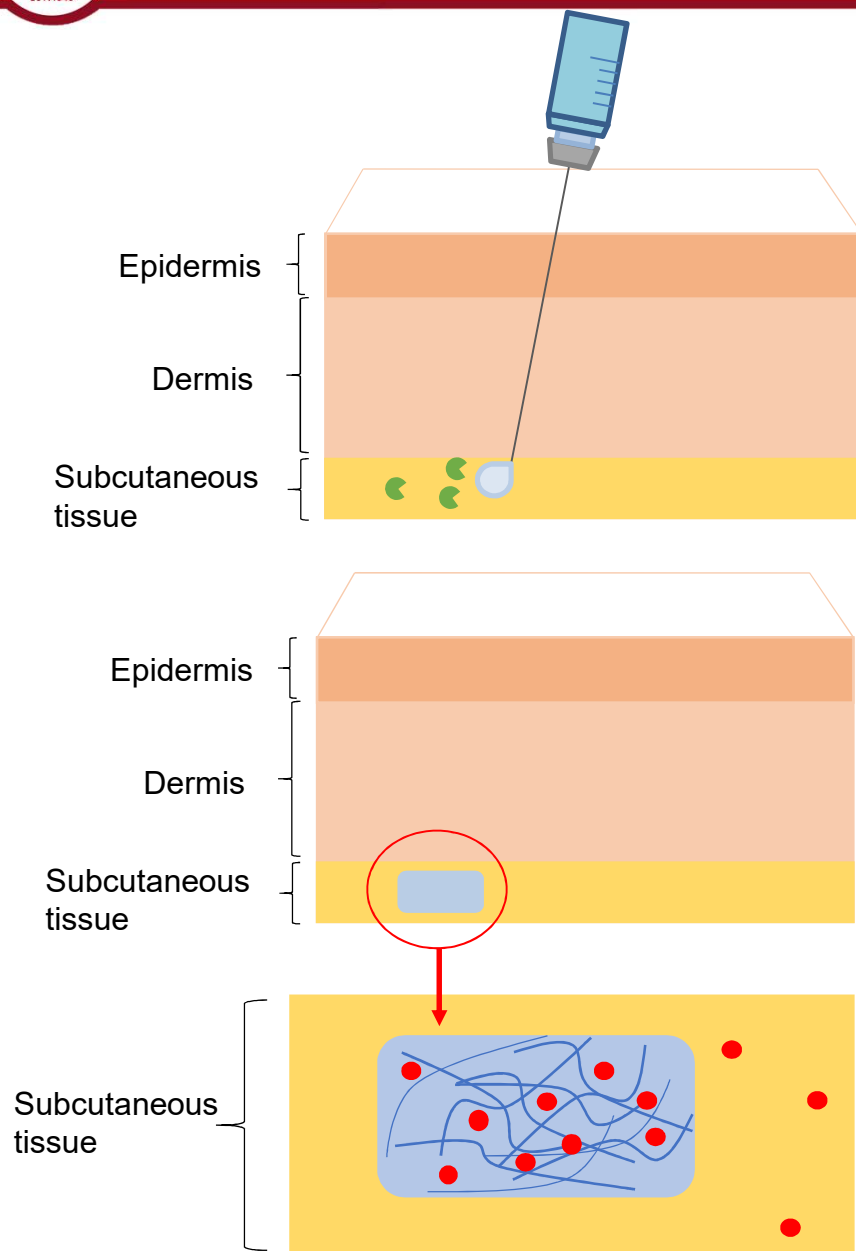
SEM
5000x



TEM
5000x



Therapeutic application



Soluble peptide-mimetic-antiretroviral conjugate administered subcutaneously each month.



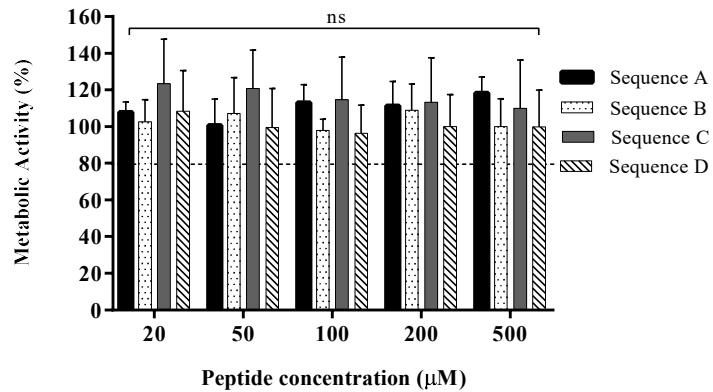
Phosphatase enzymes within the tissue cleave the phosphate group from the sequence backbone to afford a protease resistant hydrogel.



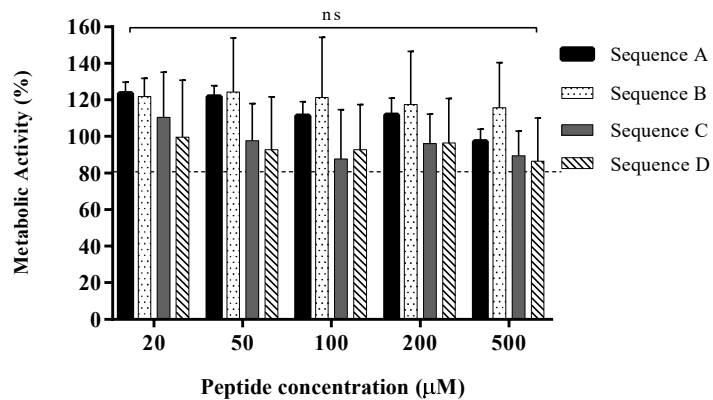
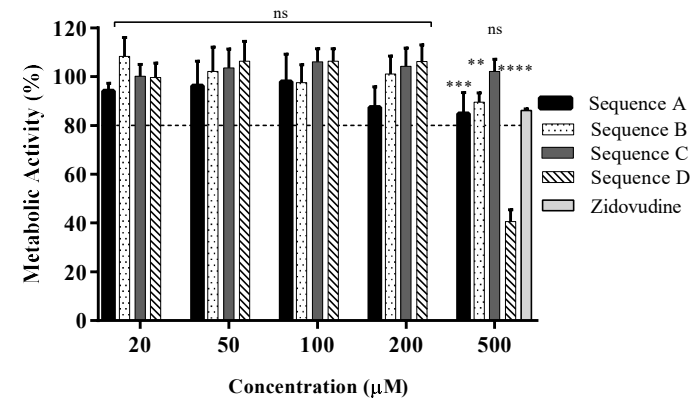
Sustained release of conjugated antiretroviral drug from stable peptide-mimetic hydrogel via hydrolysis of drug-ester linkage.



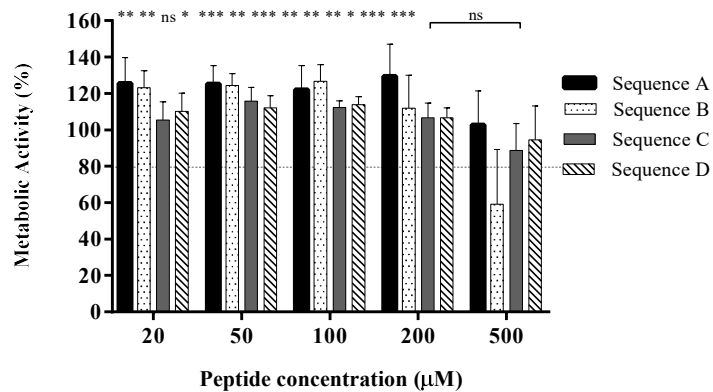
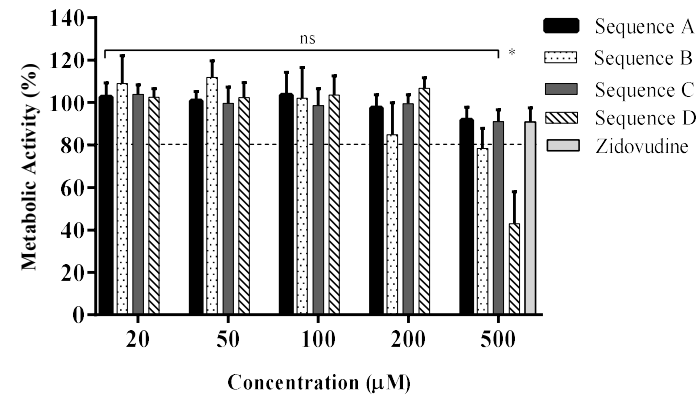
Biocompatibility



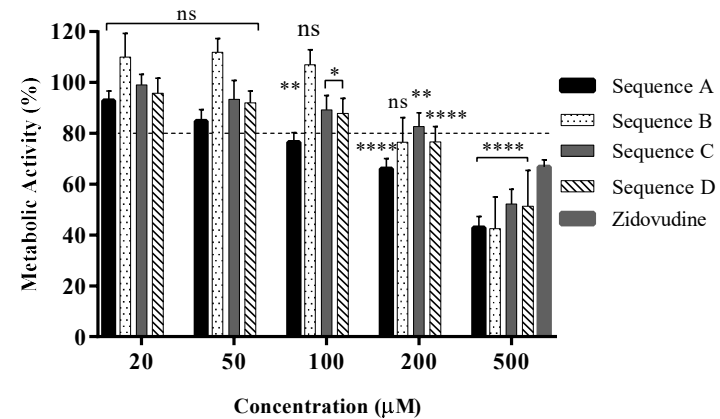
6 hour



24 hour

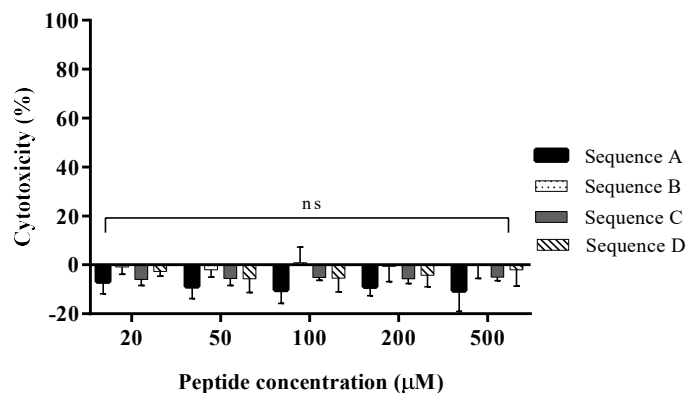


72 hour

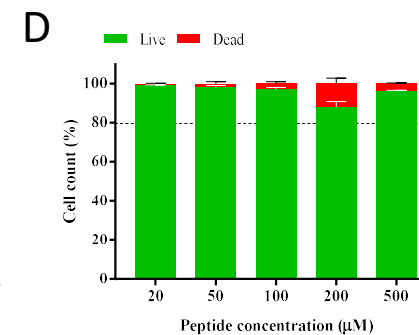
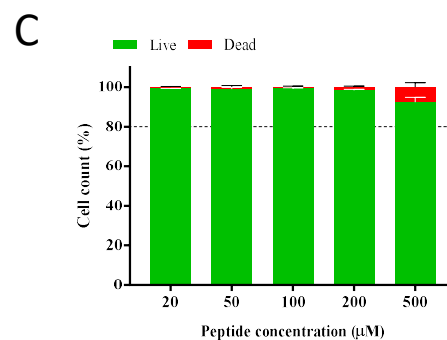
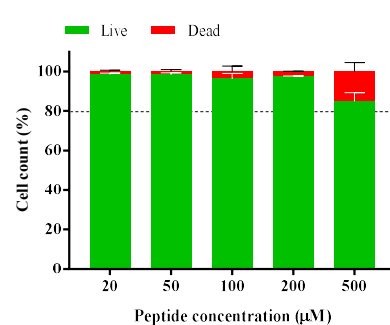
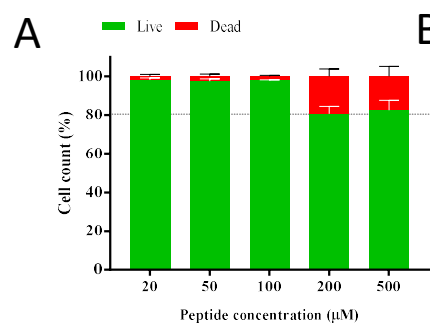
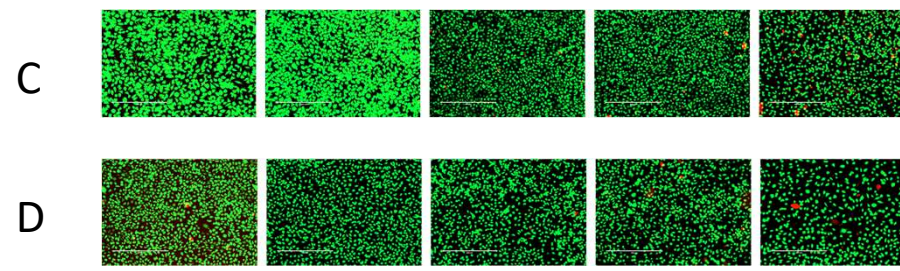
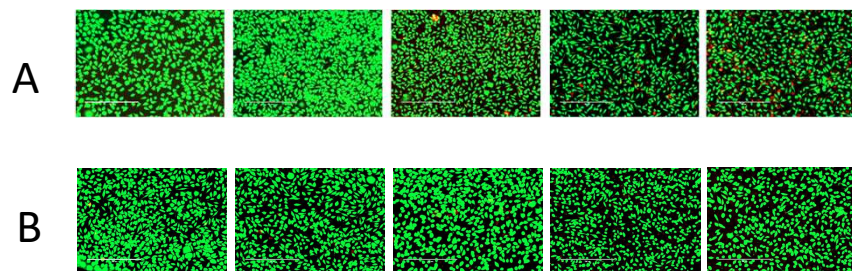
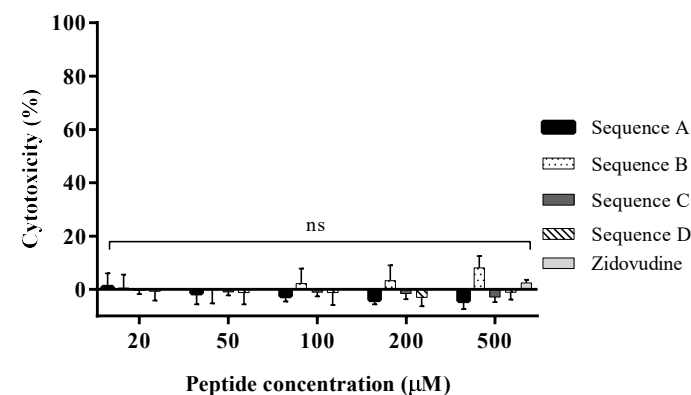




Biocompatibility

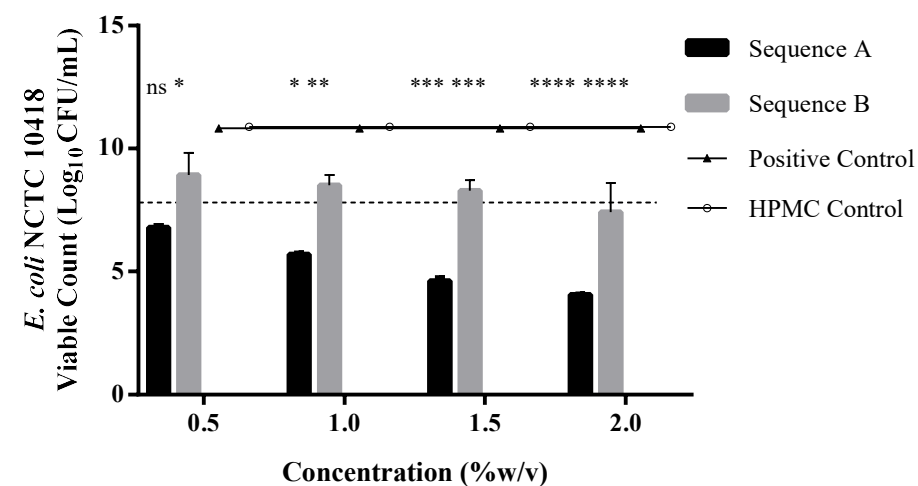
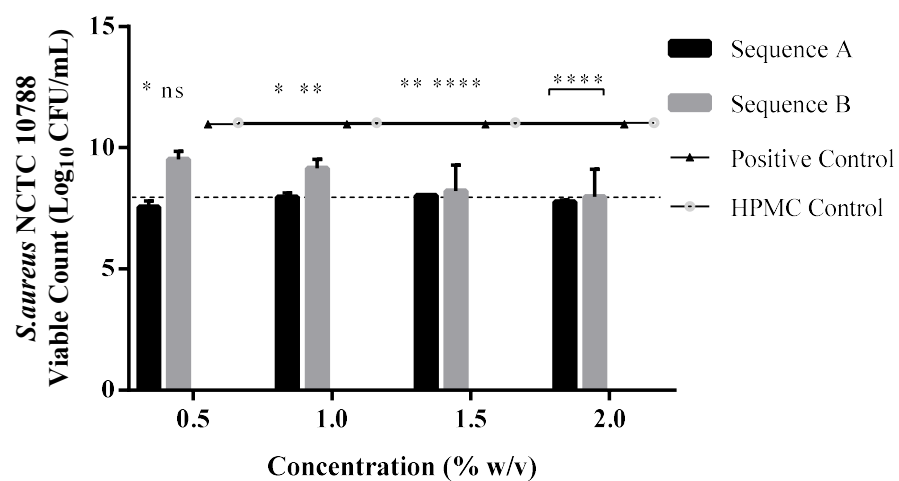


6 hour



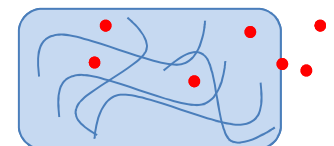
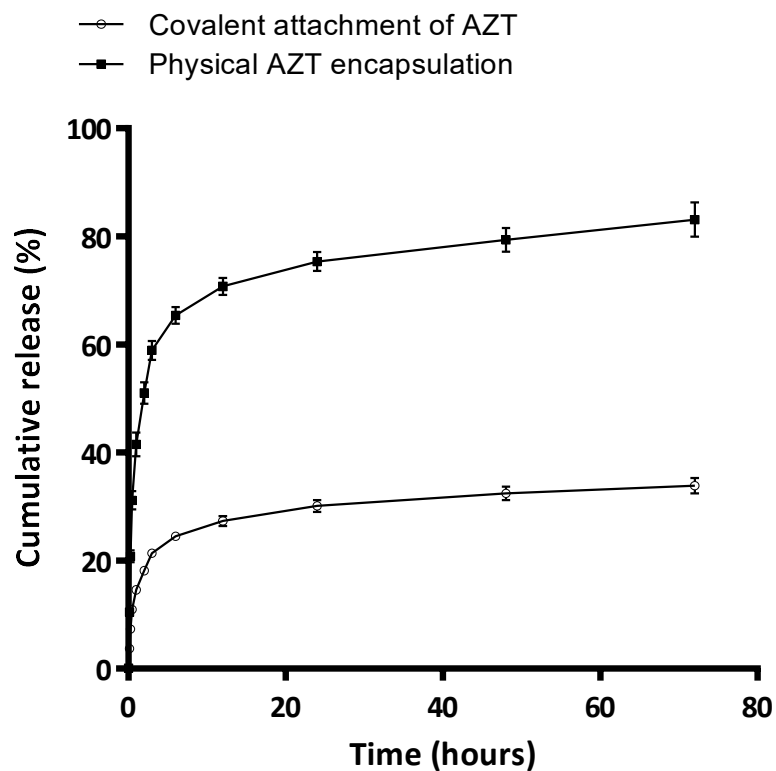


Antimicrobial activity

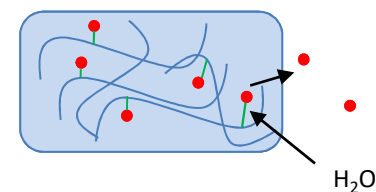




Drug release



Physical encapsulation, drug release via diffusion through hydrogel matrix



Covalent conjugation, drug release via hydrolysis of ester bond followed by diffusion through hydrogel matrix



Acknowledgements

Thank you

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- Marina Afami (Dfe funded PhD student)

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<http://lavertylab.weebly.com>

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University of Glasgow
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Trinity College Dublin



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